

WHAT IS CLAIMED IS:

- 1                   1.       A multivalent conjugate molecule comprising a carrier protein with at  
2       least three different bacterial capsular polysaccharides covalently linked to the carrier protein,  
3       wherein the molecule elicits protective antibodies.
- 1                   2.       The conjugate molecule of claim 1 comprising four different bacterial  
2       capsular polysaccharides covalently linked to the carrier protein.
- 1                   3.       The conjugate molecule of claim 1 comprising five different bacterial  
2       capsular polysaccharides covalently linked to the carrier protein.
- 1                   4.       The conjugate molecule of claim 1 comprising six different bacterial  
2       capsular polysaccharides covalently linked to the carrier protein.
- 1                   5.       The conjugate molecule of claim 1, wherein the carrier protein is  
2       selected from the group consisting of C $\alpha$ , C $\beta$ , tetanus toxoid, diphtheria toxoid, diphtheria  
3       toxoid analog CRM197, and a porin protein.
- 1                   6.       The conjugate molecule of claim 1, wherein the bacterial capsular  
2       polysaccharides are different Group B Streptococcus capsular polysaccharides selected from  
3       the group consisting of type Ia, type Ib, type II, type III, type V, and type VIII.
- 1                   7.       The conjugate molecule of claim 6, wherein the Group B  
2       Streptococcus capsular polysaccharides are type Ia, type III and type V.
- 1                   8.       The conjugate molecule of claim 7, wherein the carrier protein is C $\beta$ .
- 1                   9.       The conjugate molecule of claim 6, wherein the bacterial capsular  
2       polysaccharides are of a size of between 80 and 120 kilodaltons.
- 1                   10.      The conjugate molecule of claim 6, wherein between about 5 and 20%  
2       of the sialic acid residues of the bacterial capsular polysaccharides are covalently linked to  
3       the carrier protein.
- 1                   11.      The conjugate molecule of claim 6, wherein the bacterial capsular  
2       polysaccharides are present in equimolar amounts.

- 1                    12.    The conjugate molecule of claim 1, wherein the bacterial capsular  
2 polysaccharides are *Neisseria meningitidis* capsular polysaccharides selected from the group  
3 consisting of A, B, C, W, and Y.
- 1                    13.    The conjugate molecule of claim 12, wherein the *Neisseria*  
2 *meningitidis* capsular polysaccharides are B, C, and Y.
- 1                    14.    The conjugate c molecule of claim 12, wherein the *Neisseria*  
2 *meningitidis* capsular polysaccharides are C, Y, and W-135.
- 1                    15.    The conjugate molecule of claim 12, wherein the carrier protein is a  
2 porin protein, tetanus toxoid, or CRM197.
- 1                    16.    The conjugate molecule of claim 14, wherein the carrier protein is  
2 tetanus toxoid.
- 1                    17.    A method of preparing a multivalent conjugate molecule, the method  
2 comprising covalently linking at least three different bacterial capsular polysaccharides to a  
3 carrier protein.
- 1                    18.    The method of claim 17, wherein covalently linking the bacterial  
2 capsular polysaccharides to the carrier protein comprises steps of:  
3                    (a) oxidizing the polysaccharides;  
4                    (b) coupling the oxidized polysaccharides to the carrier protein.
- 1                    19.    The method of claim 18, wherein the polysaccharides are coupled to  
2 the carrier protein by reductive animation.
- 1                    20.    The method of claim 18, wherein the polysaccharides are conjugated to  
2 the carrier protein by a bispacer coupling with a linker.
- 1                    21.    The method of claim 17, wherein the carrier protein is selected from  
2 the group consisting of C $\alpha$ , C $\beta$ , tetanus toxoid, diphtheria toxoid, diphtheria toxoid analog  
3 CRM197, and a porin protein.

- 1                   22.     The method of claim 17, wherein the bacterial capsular  
2 polysaccharides are different Group B Streptococcus capsular polysaccharides selected from  
3 the group consisting of type Ia, type Ib, type II, type III, type V, and type V.
- 1                   23.     The method of claim 22, wherein the Group B Streptococcus capsular  
2 polysaccharides are type Ia, type III, and type V.
- 1                   24.     The method of claim 23, wherein the carrier protein C $\beta$ .
- 1                   25.     The method according to claim 22, wherein between about 5 and 20%  
2 of the sialic acid residues of the bacterial capsular polysaccharides are oxidized.
- 1                   26.     The method according to claim 22, wherein between about 5 and 20%  
2 of the sialic acid residues of the bacterial capsular polysaccharides are coupled to protein.
- 1                   27.     The method of claim 17, wherein the bacterial capsular  
2 polysaccharides are *Neisseria meningitidis* capsular polysaccharide selected from the group  
3 consisting of A, B, C, W, and Y.
- 1                   28.     The method of claim 27, wherein the *Neisseria meningitidis* capsular  
2 polysaccharides are B, C, and Y.
- 1                   29.     The method of claim 27, wherein the *Neisseria meningitidis* capsular  
2 polysaccharides are C, Y, and W-135.
- 1                   30.     The method of claim 27, wherein the carrier protein is recombinant  
2 porin B, tetanus toxoid, or CRM197.
- 1                   31.     The method of claim 29, wherein the carrier protein is tetanus toxoid.
- 1                   32.     A method of preventing or attenuating an infection in a mammal, the  
2 method comprising administering to the mammal a multivalent conjugate molecule  
3 comprising a carrier protein with at least three different bacterial capsular polysaccharides  
4 covalently linked to the carrier protein, wherein the multivalent conjugate molecule is  
5 administered in an amount sufficient to elicit protective antibodies against the bacterial  
6 capsular polysaccharides.

1                   33.     The method of claim 32, wherein the carrier protein is selected from  
2 the group consisting of C $\alpha$ , C $\beta$ , tetanus toxoid, diphtheria toxoid, diphtheria toxoid analog  
3 CRM197, and a porin protein.

1                   34.     The method of claim 32, wherein the multivalent conjugate molecule is  
2 administered to prevent or attenuate an infection caused by Group B Streptococcus and the  
3 bacterial capsular polysaccharides of the conjugate molecule are different Group B  
4 Streptococcus capsular polysaccharides selected from the group consisting of type Ia, type Ib,  
5 type II, type III, type V, and type VIII.

1                   35.     The method of claim 34, wherein the Group B Streptococcus  
2 polysaccharides are type Ia, type III and type V.

1                   36.     The method of claim 35, wherein the carrier protein is C $\beta$ .

1                   37.     The method of claim 32, wherein the multivalent conjugate molecule is  
2 administered to prevent or attenuate an infection caused by *Neisseria meningitidis* and the  
3 bacterial capsular polysaccharides of the conjugate molecule are different *Neisseria*  
4 *meningitidis* capsular polysaccharides selected from the group consisting of A, B, C, W, and  
5 Y.

1                   38.     The method of claim 37, wherein the *Neisseria meningitidis* capsular  
2 polysaccharides are B, C, and Y.

1                   39.     The method of claim 37, wherein the *Neisseria meningitidis* capsular  
2 polysaccharides are C, Y, and W-135.

1                   40.     The method of claim 37, wherein the carrier protein is recombinant  
2 porin B, tetanus toxoid, or CRM197.

1                   41.     The method of claim 39, wherein the carrier protein is tetanus toxoid.

1                   42.     A pharmaceutical composition comprising a multivalent conjugate  
2 molecule comprising a carrier protein with at least three different bacterial capsular  
3 polysaccharides covalently linked to the carrier protein and a pharmacological acceptable  
4 carrier, wherein the multivalent conjugate molecule is in an amount sufficient to elicit  
5 protective antibodies against the three different bacterial capsular polysaccharides.

1                   43.     The pharmaceutical composition of claim 42, wherein the carrier  
2 protein is selected from the group consisting of C $\alpha$ , C $\beta$ , tetanus toxoid, diphtheria toxoid,  
3 CRM197, and a porin protein.

1                   44.     The pharmaceutical composition of claim 42, wherein the bacterial  
2 capsular polysaccharides are different Group B Streptococcus capsular polysaccharides  
3 selected from the group consisting of type Ia, type Ib, type II, type III, type V, and type VIII.

1                   45.     The pharmaceutical composition of claim 44, wherein the Group B  
2 Streptococcus capsular polysaccharides are type Ia, type III and type V.

1                   46.     The pharmaceutical composition of claim 45, wherein the carrier  
2 protein is C $\beta$ .

1                   47.     The pharmaceutical composition of claim 42, wherein the bacterial  
2 capsular polysaccharides of the immunogenic molecule are different *Neisseria meningitidis*  
3 capsular polysaccharides selected from the group consisting of A, B, C, W, and Y.

1                   48.     The pharmaceutical composition of claim 47, wherein the *Neisseria*  
2 *meningitidis* capsular polysaccharides are B, C, and Y.

1                   49.     The pharmaceutical composition of claim 47, wherein the *Neisseria*  
2 *meningitidis* capsular polysaccharides are C, Y, and W-135.

1                   50.     The pharmaceutical composition of claim 47, wherein the carrier  
2 protein is tetanus toxoid, recombinant porin B or CRM197.

1                   51.     The pharmaceutical composition of claim 49, wherein the carrier  
2 protein is tetanus toxoid.